

Detailed action: Interview

The Applicants wish to thank Examiner Kasztejna and his supervisor, Examiner Flanagan, for the courtesy extended during the personal interview with Applicants' representative Ned Israelsen and one of the inventors, Byong-Ho Park, on February 21, 2006. During the interview, two micromanipulators having the symmetrical bending elements illustrated in Figures 2A and 2B were shown to the Examiners, as well as a catheter with a micromanipulator mounted at the distal end. In addition, a photomicrographic movie of micromanipulators according to Figure 2B of the present application was shown, illustrating those elements bending under the influence of a co-located force-generating actuator. One movie showed a micromanipulator with an ultrasound transducer located thereon, and the other showed a two-element micromanipulator (with transducer) mounted in a catheter. Finally, a movie was shown that was generated in a cadaver vessel with an artificial lesion, using a forward-looking ultrasound transducer mounted on a micromanipulator of the present invention.

The obviousness rejections were discussed, along with proposed claims. The Konstorum reference and the Lenker reference were also discussed. Applicants' representative noted that Konstorum does not have bending elements that are symmetrical with respect to the axis, and that Lenker does not bend his mechanically-jointed catheter away from the axis, but rather partially rotates the ultrasound transducers. The substance of the interview is further incorporated into the foregoing amendments and the following remarks.

Applicants also wish to thank Examiner Kastzejna for making an interview summary of record. This interview summary indicates that agreement was reached, although further searching may be appropriate. Applicants concur with this interview summary.

Detailed action: Comments on amendments to the claims

Claims 1-2 and 4-49 are pending. Claim 3 is cancelled. Claims 1, 18, 26, 29, and 39 are currently amended. Support for the amendments can be found throughout the specification and the drawings and in the original claims as filed. For example, support for the amendments to Claim 1, 18, 26 and 29 can be found at page 6, lines 19-25, and in Figures 2A and 2B. Support for the amendment to Claim 39 can be found, for example, at page 11, line 18. New Claims 40-49 have been added. Support for these new claims can likewise be found throughout the specification and in the original claims as filed. Support for Claims 40 and 41 can be found at, for example, page 12, line 25 through page 13, line 2 of the specification. Support for Claims 42, 43, 45 and 46 can be found at, for example, page 6, lines 19-25 of the specification. New Claims 44 and 47 find support at, for example, page 9, line 10 of the specification. New Claims 48 and 49 are supported, for example, in Fig. 3. No new matter has been added. Claims 1-2 and 4-49 are presented for review and consideration.

Detailed action: claim rejections under 35 USC 102

Claims 1-6, 10, 26, 29, and 31 stand rejected as anticipated by US 6,749,560, hereinafter Konstorum.

Independent claims 1, 26, and 29 are currently amended. Applicant respectfully holds that these claims are not taught or suggested by Konstorum.

Konstorum discloses endoscopic apparatus with bending segments formed by cutting slots alternately into two or more sides of a tube. Such segments are adapted to only bend one direction, that is, in the direction of the slot to close the slot. (See, e.g., Konstorum Fig. 5.) Also, such segments are not symmetrical with respect to the axis of the tube.

In contrast, claim 1, as amended, requires:

"... each symmetrical bending segment of the compliant mechanism is capable of being controlled to bend away from the axis in a first direction and in an opposite, second direction, with substantially the same degree of strain."

Because Konstorum does not have the claimed symmetrical elements, and because such elements cannot bend in opposite directions with the substantially the same degree of strain, amended claim 1 is not anticipated, nor are its dependent claims.

Similarly, claim 26 requires "force generating actuators being attached to and located with said element." In contrast, Konstorum uses actuator wires that run the length of the endoscope, so that the force is being generated remotely when pulling on the wire, instead of being generated locally at the bending element, as required in claim 26. Claim 29 similarly

requires that the force-generating actuator is "located with" the compliant mechanism. Thus, Konstorum cannot anticipate claims 26 or 29.

Claims 2, 4-6 and 10 depend from claim 1, and claim 31 depends from claim 29. Therefore the above arguments and amendments in connection with claims 1 and 29 are also responsive to this rejection of claims 2, 4-6 and 10. Claim 3 is canceled.

Detailed action: claim rejections under 35 USC 103

Claims 1, 7-25, 27-28, 30, and 32-39 stand rejected over US 6,110,121, hereinafter Lenker, in view of Konstorum.

As is discussed above, Konstorum et al. does not disclose symmetrical bending elements of the type required in claim 1. Adding the Konstorum "alternating slot" structure to Lenker (in place of Lenker's mechanical swivel joint) does not result in the claimed invention, since claim 1 requires that bending segments are symmetrical with respect to the axis. Further, such a combination would defeat the purpose of Lenker's structure (rotational twisting motion for side-looking ultrasound), whereas claim 1 explicitly requires bending motion away from the axis. For all of these reasons, the cited references do not establish prima facie obviousness of claim 1 and its dependent claims.

Independent claims 18, 26, and 29, and their dependent claims, require force-generating actuators located with the compliant mechanism, as well as bending motion away from the axis. Since Lenker does not teach bending motion, but rather

rotational motion with a mechanical joint, and since modifying Lenker to provide bending motion away from the axis would defeat its purpose, there is no motivation to combine. Further, any force-generating actuator of Lenker does not provide bending motion, and Konstorum does not provide actuators "located with" the compliant mechanism. For these additional reasons, claims 18, 26 and 29 and their dependent claims are not obvious in light of Lenker and Konstorum.

REMARKS

For all of the foregoing reasons, and in light of the discussion at the personal interview, it is believed that these amendments and remarks place the application in condition for allowance. If there are any remaining obstacles to prompt allowance that could be resolved by telephone, the Examiner is invited to contact the undersigned at the number below.

Respectfully submitted,



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